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EXAMINER

EHICHIOYA, FRED I

ART UNIT

PAPER NUMBER

2172

DATE MAILED: 09/25/2003

5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/783,820

Applicant(s)

PUDIPEDDI ET AL.

Examiner

Fred I. Ehichioya

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Response to Arguments

1. Claims 1 – 25 are pending in this office action.
2. The drawings filed on February 15, 2001 are accepted
3. Claim 23 have been amended by the applicants
4. Applicant's arguments with respect to claims 1 – 25 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 3, 7, 9, 10, 22, 23, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,378,036 issued to Jesse S. Lerman et al. (Hereafter "Lerman") in view of U.S. Patent 6,279,074 issued to Jerry Wayne Pence (hereafter "Pence").

Regarding claim 1, Lerman teaches a method of recalling data objects stored on a plurality of media comprising:

creating a plurality of queues, wherein each one of said queues corresponds to one of said media (see column 2, lines 15 and column 4, lines 5 – 10);

placing said requests on the created queues, wherein each request is placed on the queue corresponding to the medium on which the requested data object is located (see column 3, lines 34 – 37 and column 6, lines 43 – 44);

activating a first of said queues, said first queue being associated with a first of said plurality of media (see column 5, lines 10 – 67); and

retrieving, from said first medium, the data objects requested on the first queue (see column 5, lines 30 – 36 and column 7, lines 2 – 17).

Lerman does not explicitly teach receiving a plurality of requests to recall data objects, each data object being located on a particular one of said plurality of media.

However, Pence teaches receiving a plurality of requests to recall data objects, each data object being located on a particular one of said plurality of media (see column 2, lines 56 – 58).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify teaching of Lerman with the teaching Pence wherein the queues of Lerman could be modified to receive a plurality of recall request. The motivation is that Pence teaching of a priority of data that are associated with each recall request in the queue could also be applicable to a plurality of queues. These data could be stored or recalled in a plurality queues as well as a single queue.

Regarding claim 2, Lerman and Pence disclose the claimed subject matter as discussed in claim 1. Lerman further discloses wherein each queued request indicates the offset from a predetermined location on a medium at which the requested data object is located, and wherein said placing act comprises:

organizing the requests on each queue in a first and a second sequence, each sequence comprising a set of requests whose offsets are monotonically increasing within the respective sequence (see column 8, lines 57 – 67, column 9, lines 1 – 23 and column 10, lines 45 – 46).

Regarding claim 3, Lerman and Pence disclose the claimed subject matter as discussed in claim 1. Lerman further discloses activating a second of said queues, said second queue being associated with a second of said plurality of media, the second medium being different from said first medium (see column 10, lines 30 – 33); and

retrieving, from said second medium, the data objects requested on the second queue, the retrieval occurring at least in part concurrently with the retrieval of data

objects from the first medium (see column 1, lines 39 – 42 and column 10, lines 60 – 61).

Regarding claim 7, Lerman and Pence disclose the claimed subject matter as discussed in claim 1. Pence further discloses wherein the act of creating a plurality of queues comprises time stamping each of the created queues, and wherein the act of activating a first of said plurality of queues comprises selecting a queue to be activated based on the timestamps of the respective queues (see column 2, lines 57 – 58; column 5, lines 51 – 52; column 7, lines 60 – 67 and column 8, lines 1 – 4).

Regarding claim 9, Lerman and Pence disclose the claimed subject matter as discussed in claim 1. Pence further discloses wherein said method is performed in a computing environment comprising a hard disk, said method further comprising:

determining that said data objects are not located on said hard disk (see column 3, lines 59 – 66).

Claims 10 is essentially the same as claim 1 except that it sets forth the claimed invention as a computer-readable medium having computer-executable instructions rather than a method and therefore rejected for the same reasons as applied hereinabove.

Regarding claim 22, Lerman does not explicitly disclose a hard disk; a file system which manages files on said hard disk, which stores to information indicating which of said files have been migrated to said media, and which issues a request to said queuing module for requested files that have been migrated to said media.

However, Pence discloses a hard disk (see column 3, line 34);

a file system which manages files on said hard disk, which stores to information indicating which of said files have been migrated to said media, and which issues a request to said queuing module for requested files that have been migrated to said media (see column 1, lines 34 – 41 and column 6, lines 35 – 36).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify teaching of Lerman with the teaching Pence wherein the hard disk is a storage device for the recall request queues. The motivation is that the hard disk provides more space for more frequently used data sets these devices. Consequently, this provides efficient storage and access on these queues.

Regarding claim 23, Lerman does not explicitly disclose wherein said queuing module timestamps each queue at the time that the queue is created, and wherein said activation module selects a queue for activation based on the timestamps of the created cues.

However, Pence discloses wherein said queuing module timestamps each queue at the time that the queue is created, and wherein said activation module selects a

queue for activation based on the timestamps of the created cues (see column 5, lines 11 – 17 and 51 – 52; column 7, lines 60 – 67 and column 8, lines 1 – 4).

It should be noted that although Pence does not explicitly disclose “timestamps each queue at the time that the queue is created”, Pence discloses in column 5, lines 51 – 52, “ A timestamp field 46 indicates the time at which the recall request was initiated”. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Lerman with the teaching of Pence wherein Pence’s timestamp field is modified to accommodate the creation data and time for each queue at the time of creation. The motivation is that timestamp makes it possible to serialize the queues according to time of creation. Timestamp also makes it to decide on which data and on which queue to recall.

Claims 25 is essentially the same as claim 1 except that it sets forth the claimed invention as a system for recalling data object from plurality of media rather than a method and therefore rejected for the same reasons as applied hereinabove.

6. Claims 11 and 15 - 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pence in view of U.S. Patent 6,490,666 issued to Cabrera et al (hereinafter “Cabrera”).

Regarding claim 11, Pence teaches in a computing environment having a first plurality of drives in which data objects to be retrieved are stored on a second plurality

of media mountable on said drives, a method of obtaining data objects from said media comprising:

identifying a first data object located on a first of said media (see column 2, lines 55 – 67);

identifying a second data object located on a second of said media different from said first medium (see column 3, lines 3 – 6); and

Pence does not explicitly teach concurrently using a first and a second of said drives to retrieve said first and second data objects from said first and second media.

However Cabrera teaches concurrently using a first and a second of said drives to retrieve said first and second data objects from said first and second media (see column 9, lines 5 – 13).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Pence with the teaching of Cabrera wherein objects retrieved concurrently from the two media. The motivation is that this concurrent transition saves time.

Claims 15 is essentially the same as claim 11 except that it sets forth the claimed invention as a computer-readable medium having computer-executable instructions rather than a method and therefore rejected for the same reasons as applied hereinabove.

Regarding claim 16, Pence teaches a method of scheduling requests to recall data objects from a medium, said medium being mounted on a drive, said drive having a reading head, said method comprising:

receiving a new request to recall a data object from said medium, said data object being located at a first offset along said medium (see column 2, lines 64 – 67);

identifying a queue comprising a plurality of requests to recall data from said medium, said requests having an order, each of said requests corresponding to a particular data object stored on said medium and indicating an offset into said medium at which the corresponding data object is located, said requests forming first and second sequences, said first sequence preceding said second sequence in said queue with respect to said order (see column 2, lines 57 – 67; column 3, lines 1 – 2 and column 6, lines 53 – 58),

Pence does not explicitly teach wherein the offsets of the requests within said first sequence are a maximally monotonically increasing series; determining the location of said reading head along said medium; determining that the location of said reading head is beyond said first offset; inserting said new request into said queue into a position that, with respect to said order, is subsequent to said first sequence.

However, wherein the offsets of the requests within said first sequence are a maximally monotonically increasing series (see column 10, lines 46 – 48);

determining the location of said reading head along said medium (see column 7, lines 39 – 46);

determining that the location of said reading head is beyond said first offset (see column 7, lines 45 – 46 and column 9, line 32);

inserting said new request into said queue into a position that, with respect to said order, is subsequent to said first sequence (see column 8, lines 52 – 55).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Pence with the teaching of the teaching of Cabrera wherein response is made to the recall data request received by a request processing module. A retrieval module locates the requested data in a logical data unit (e.g., a data block) of the secondary storage device and transfers the logical data unit to an available data buffer. The motivation is that locating the proper insertion point of new recall request is efficient and easy due to the ordered linked list.

Regarding claim 17, Pence and Cabrera disclose the claimed subject matter as discussed in claim 16, Cabrera further discloses wherein the offsets of the requests within said second sequence area maximally monotonically increasing series (see column 10, lines 18 – 22 and lines 46 - 48).

Regarding claim 18, Pence and Cabrera disclose the claimed subject matter as discussed in claim 17. Cabrera further discloses wherein the position in said second sequence in which said new request is inserted is based on said first offset, such that the monotonically increasing nature of said second sequence is preserved following the

insertion (see column 8, lines 16 – 22, lines 52 – 55; column 10, lines 18 – 22 and lines 46 - 48).

Regarding claim 19, Pence and Cabrera disclose the claimed subject matter as discussed in claim 16, Cabrera further discloses selecting, from among a plurality of queues, a particular queue into which to insert said new request, wherein each one of said plurality of queues corresponds to a different medium, the selection being based on the particular medium on which the data object is located (see column 7, lines 57 – 60 and column 8, lines 52 – 58).

Claims 20 is essentially the same as claim 16 except that it sets forth the claimed invention as a computer-readable medium having computer-executable instructions rather than a method and therefore rejected for the same reasons as applied hereinabove.

7. Claims 4, 5, 6, 8, 12, 13, 14 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lerman in view of Pence and further in view of Cabrera.

Regarding claim 4, Pence and Lerman disclose the claimed subject matter as discussed in claim 1. Pence or Lerman does not explicitly disclose wherein each of said queues comprises a linked list of requests.

However, Cabrera teaches wherein each of said queue comprises a linked list of requests ("The buffer headers are organized in the LRU 301 as a doubly linked list forming a circular queue, as shown in FIG. 3. Although only five headers and five data buffers are shown in FIG. 3", see column 7, lines 12 – 14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Pence and Lerman with the teaching of Cabrera wherein linked list forms a circular queue. The motivation is that each buffer header points to a data buffer, which is aligned in the memory to maximize transfer rates.

Regarding claim 5, Pence and Lerman disclose the claimed subject matter as discussed in claim 1. Cabrera discloses further comprising querying a database to determine the locations of the requested data objects (see column 2, lines 37 – 41).

Regarding claim 6, Pence and Lerman disclose the claimed subject matter as discussed in claim 1. Cabrera further discloses wherein the location provided by said database comprises a media identifier and an offset into the identified medium (see column 10, lines 45 – 48).

Regarding claim 8, Pence and Lerman disclose the claimed subject matter as discussed in claim 1. Pence further discloses said method being performed in a multi

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threaded environment wherein plural threads execute concurrently, said method further comprising:

placing a request on a queue (see column 6, line 58); and

changing a queue from a non-active state to an active state (see column 7, lines 8 – 18);

Pence or Lerman does not explicitly teach acquiring a lock prior to performing an action selected from the group consisting of: said lock being acquirable by only one of said threads at a given time; and releasing said lock subsequent to performing an action in said group.

However, Cabrera teaches acquiring a lock prior to performing an action selected from the group consisting of (see column 9, lines 56 – 58):

said lock being acquirable by only one of said threads at a given time (see column 9, lines 52 – 53); and

releasing said lock subsequent to performing an action in said group (see column 9, lines 56 – 63).

Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Pence and Lerman with the teaching of Cabrera wherein the locking coordinates multiple user and multiple thread accesses to the buffered data. The motivation is that recall requests are therefore processed in the other of priority.

Regarding claim 12, Pence and Cabrera teach the claimed subject matter as discussed in claim 11. Pence or Cabrera do not explicitly teach further comprising: creating a first queue corresponding to said first medium; placing first data on said first queue, said first data being indicative of said first data object; creating a second queue corresponding to said second medium; and placing second data on said second queue, said second data being indicative of said second data object.

However, Lerman teaches further comprising:

creating a first queue corresponding to said first medium (see column 4, lines 1 – 15);

placing first data on said first queue, said first data being indicative of said first data object (see column 4, lines 34 – 41);

creating a second queue corresponding to said second medium (see column 4, lines 1 – 15); and

placing second data on said second queue, said second data being indicative of said second data object (see column 4, lines 34 – 41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Pence and Cabrera with the teaching of Lerman wherein the queues allow concurrent transaction. The motivation is that the locking coordinates multiple user and multiple thread accesses to the buffered data. The recall requests are therefore processed in the order of priority.

Regarding claim 13, Pence, Cabrera and Lerman teach the claimed subject matter as discussed in claim 12, Pence further teaches wherein said first data comprises a location of said first data object on said first medium, and wherein said second data comprises a location of said second data object on said second medium (see column 12, lines 66 – 67 and column 13, lines 1 –5).

Regarding claim 14, Pence and Cabrera teach the claimed subject matter as discussed in claim 11. Pence or Cabrera do not explicitly teach further comprising: identifying a third data object located on a third of said media; waiting for said first or said second data object to be retrieved from their respective media; and retrieving said third data object from said third medium.

However, Lerman teaches further comprising:

identifying a third data object located on a third of said media (see column 7, lines 12 – 22);

waiting for said first or said second data object to be retrieved from their respective media (see column 7, lines 22 – 23); and

retrieving said third data object from said third medium (see column 7, lines – 23).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Pence and Cabrera with the teaching of Lerman wherein FIFO indicates the storing and retrieving of object in the

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media. The motivation is that objects could be stored or retrieved from the media randomly, sequentially or first-in, first-out bases.

Regarding claim 24, Pence teaches wherein each requested data object is located at an offset into the medium on which the data object is located, and wherein said queuing module includes logic which maintains the requests on each of said plurality of queues in first and second sequences (see column 2, lines 64 – 67; column 3, lines 1 – 2; column 10, lines 37 – 41 and lines 59 – 65)

Lerman or Pence do not explicitly teach the offsets of the data objects requested in each of said first and second sequences comprising a maximally monotonically increasing series.

However, Cabrera teaches the offsets of the data objects requested in each of said first and second sequences comprising a maximally monotonically increasing series (see column 10, lines 18 – 22 and lines 46 – 48).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Lerman and Pence with the teaching of Cabrera wherein the storage media may have varying lengths. The motivation is that the variation in length accommodates the offset of the request.

8. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lerman.

Regarding claim 21, Lerman teaches a system for retrieving data objects from a plurality of media comprising:

a queuing module which creates a plurality of queues corresponding to said plurality of media, said queuing module receiving requests to retrieve data objects from said plurality of media and queuing each of said requests on the queue corresponding to the medium on which the requested data object is located (see column 2, line 15; column 3, lines 34 – 37; column 4, lines 5 – 10 and column 6, lines 43 – 44);

an activation module which selects queues for activation and activates the selected queues (see column 5, lines 10 – 67); and

a retrieval module which retrieves the items on one of the selected queues from the corresponding medium in the order in which the items are located on the queue (see column 5, lines 30 – 36 and column 7, lines 2 – 17).

It should be note that although Lerman does not specifically states, "activation module which selects queues for activation and activates the selected queues", however, Lerman teaches in column 5, lines 22 - 27 "As an optional step, once a request is selected, the SDS Selection Procedure checks whether the data for the selected read request is already in cache (if caching is used). If this is the case, the disk access request can be discarded and the Selection Procedure is repeated"; also in column 5, lines 37 – 40, Lerman also discloses "Each queue maintains "a sum of the worst case values" selector that performs a worst case analysis and selects the queue that will be used (in steps 320 and 330 described below) to send the next command to

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the disk drive". Therefore, one of ordinary skill in the art at the time the invention was made would have found it obvious and motivating to modify the selection procedure to activate the selection of queues. The motivation is that this procedure is a computer code that activates and selects the queues automatically.


Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred I. Ehichioya whose telephone number is 703-305-8039. The examiner can normally be reached on M - F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Y. Vu can be reached on 703-305-4393. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-303-3900.

Fred I. Ehichioya
Examiner
Art Unit 2172
September 12, 2003


KIM VU
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